

## **DEMULTIPLEXER/MULTIPLEXER WITH A CONTROLLED VARIABLE PATH LENGTH DEVICE**

### **ABSTRACT OF THE INVENTION**

A multiplexing/demultiplexing optical device comprises a beam distribution element to receive an input optical signal comprising one or more wavelengths and to distribute the optical signal into a plurality of beams. The optical device also comprises a variable path length element to receive the distributed optical signal from the first optical element, where the variable path length element comprises a plurality path sections, where a length of at least one of the path sections is variable. The optical device further comprises a beam interaction element to receive the plurality of beams from the variable path length element, wherein the plurality of beams are combined and allowed to interfere, and are thereby demultiplexed. A controller operatively coupled to the variable path length element can be provided to programmatically vary the length of one or more of the path sections. The variable path length element can include an optical switch fabric, such as a two dimensional switch fabric or a three dimensional switch fabric.